

## **White Paper: Project Delivery Methods – Buckman Diversion Project**

The structuring and hiring of a project team (project delivery method) is often critical to the success of any project. For a project as large, expensive, and complicated as the proposed Buckman Direct Diversion (Project), the project delivery method itself may have as much of an affect on the ultimate success of the project as any other factor. In the building industry today, there are several delivery methods available to owners and developers. Conventional methods of project delivery have often times given way to more creative methods in an effort to save time, save money, shift risks, and to provide a more coordinated team approach in order to reduce litigation and improve project quality.

Each project delivery method has benefits as well as its own limitations. The advantages and disadvantages of each method must be evaluated relative to the objectives of each project. This implies that first and foremost, the objectives of a project (decision drivers) must be established prior to the evaluation of the available project delivery methods. These project objectives must prioritize, among other things, quality, schedule, cost, and risk, which are then balanced with the owner/developer's in-house capabilities. The success of any of these methods is also very dependent upon the owner's capability for managing the project delivery process. A list of project objectives/success criteria for the Project follows:

### **Decision Drivers and Objectives:**

- Save on overall cost
- Know total costs early in the process
- Option for a fixed "Guaranteed Maximum Price" (GMP) (at risk)
- Shift risk from owner to contractor(s)
- Obtain expertise staff to build a complex project/shift administrative burden
- One point of contact to optimize the coordination of efforts
- Improve on quality/performance of product
- Reduce claims, change orders, and litigation
- Establish schedule early in the process
- Stay on schedule
- Project delivered in shortest period of time
- Increase innovation and creativity during design

More public organizations (water, rail transport, roads, airports & others) are seeking better practices. Some are using or evaluating alternative models such as Design-Build (DB), Design-Build-Operate-Maintain (DBOM), and Design-Build-Finance-Operate (DBFO). In addition, there is Design Build Own Operate Transfer (DBOOT) which is similar to the DBOM and DBFO model, but there is an official transfer of ownership.

Once the project objectives are established and the owner/developer's capabilities are defined, then the characteristics of the project can lead to the appropriate project delivery decision. A discussion of the characteristics of each main project delivery method follows:

### **Traditional Method:**

#### **Design-Bid-Build:**

The design-bid-build (D-B-B) is the most common and traditional form of project delivery method and is characterized by the owner having numerous separate contracts with the design team and the construction team. The phasing of the work is sequential (not concurrent and/or overlapping efforts).. First is the design phase, second is the bidding phase and lastly, the construction phase. Typically, in a public organization the proposal is in an open competition for a "Low Price". The contractor that wins the award is legally bound to produce the project at a price, schedule, and minimum level of standard care. After completion of the project, the Owner is then responsible for operations and maintenance of the project. The Owner is also responsible for all the financing aspects. This method allows more for competitive bidding and spreading work to numerous contractors/subcontractors. Design suffers from a lack of input from contractors. Procurement of subcontractors by the General Contractor is often un-businesslike during the bid period, and is naturally adversarial. This causes delays and cost overruns, if bids are over. Some of the main criticisms of the traditional Design-Bid-Build (D-B-B) method are the lack of innovation, delayed completion periods, and cost overruns sometimes encountered on projects. Often there can be design and/or construction flaws with leads to poor product quality. Since the client bears most of the risks of both the design and construction aspects, there needs to be better practices to assure the client's needs are being met, quicker project completion times, and cost effective solutions.

### **Alternative Methods**

#### **Alternate Method 1: Construction Manager - Not-At-Risk (At-Fee)**

This method involves the hiring of a construction manager who then serves to broker the hiring of subcontractors under direct contract with the owner. The roles of owner,

architect and construction manager are similar to those of owner, architect and contractor. However, in order to reduce the construction cost, the owner takes on the risk ordinarily assumed by the contractor. The contractor acts in both advisory and technical roles during design and construction. Responsibilities, at a minimum, include scheduling, cost, and quality control. CM may be an architect, a contractor, or a business administrator. The CM approach allows for fast-tracking because issues of constructability, cost, and schedule can be addressed during design; however, there is little room for change orders. Under this approach there are multiple prime contracts, additional sets of relationships, potentially unresolved/unclear responsibilities/roles, and additional cost to the Owner for CM fees. Therefore, there is the potential for increased claims. This is a process similar to DBB, the traditional model, in which the Owner/Client is responsible for the design, bidding, and construction of a project. However, the CM organization takes on the responsibility for administration & management, constructability issues, day-to-day activities, and assumes an advisory role to the Owner/ Client. The CM organization has no contractual obligation to the Design and Construction entities. Again, the Owner is responsible for operations and maintenance of the project as well as the financing aspects.

#### Alternate Method 2: Construction Management - At Risk Advisor (CM - At Risk)

In this scenario the Owner/Client has one agreement with the Construction Manager, who then manages the contracts with the Design Consultant and the General Contractor. CM-At Risk assumes much of the risks of the project, which differentiates this model from CM – Not at Risk (At Fee) and DBB, where the Owner maintains the risk. Again, the Owner is responsible for operations and maintenance of the project as well as the financing aspects.

#### Alternate Method 3: Design-Build

The Design-Build (DB) method involves the owner hiring one entity, a design-builder, to provide both design and construction services. Financing of the project is the responsibility of the owner. This method requires a clearly defined scope of work. A cost commitment is made early in the design process. Typically, design-build is employed for projects having a specialized nature, (e.g., water treatment plants). The DB approach has a fast schedule, best cost control, and least amount of claims. There is a single-point responsibility, i.e., one contract for design and construction. Additional strengths of DB include reduced owner's risks, establishing a fixed price early in the process and this method establishes a fixed schedule. Under DB, there is a single source responsibility, better coordination, and this method distances the owner from project details/conflicts. This method lends itself to simplified decision-making. However, there may be little owner control in design and cost pressure and value engineering can potentially impact quality if not properly managed.

## **Design- Build Hybrids**

### **Alternative Method 4: Design-Build Own Operate Transfer (DBOOT):**

DB Own Operate Transfer is a project delivery method similar to DBFO (below), except that there is an actual transfer of ownership. The Contractor is responsible for the design, construction, maintenance, operations, and financing of the project. The Contractor assumes the risks of financing until the end of the contract period. Subsequently, the Owner is then responsible for operations and maintenance of the asset.

### **Alternative Method 5: Design-Build-Operate-Maintain (DBOM)**

Design-Build-Operate-Maintain is a project delivery method in which the Owner/Client selects an organization that will complete the design, construction, maintenance and an agreed upon period of operational parameters under one agreement. Upon termination of the operational period, the Owner is then responsible for operations and maintenance of the project, unless the operations are continued under a separate procurement method.

### **Alternative Method 6: Design-Build/Finance/Operate (DBFO)**

Design-Build/Finance/Operate is a project delivery method similar to DBOM, except that the Contractor is also responsible for the financing of the project. The contractor assumes the risks of financing until the end of the contract period. The Owner is then responsible for operations and maintenance of the asset.

**Summary Table**

| Delivery Method | Advantages  | Disadvantages  |
|-----------------|---|--|
| D-B-B           | <ul style="list-style-type: none"> <li>• Long history of acceptance</li> <li>• Open competition</li> <li>• Distinct roles are clear</li> <li>• Familiar method to owner</li> </ul>  | <ul style="list-style-type: none"> <li>• Innovation not optimized</li> <li>• Usually cost overruns</li> <li>• Adversarial disputes between parties</li> <li>• Usually "low-bid" so incentive for change orders</li> <li>• Owner retains most of risks</li> <li>• Linear process</li> </ul> |
| CM at Fee       | <ul style="list-style-type: none"> <li>• Provides mngt and admin for entire project</li> <li>• Treats planning, design and construction as integrated tasks</li> <li>• Some costs and schedule control</li> </ul>   | <ul style="list-style-type: none"> <li>• No contractual relationship with trades subs</li> <li>• No contractual responsibility for outcome of project</li> <li>• Owner retains risks</li> </ul>  |
| CM at Risk      | Same as CM at Fee, but also: <ul style="list-style-type: none"> <li>• Good for owners with insufficient staff</li> <li>• More owner flexibility</li> <li>• <b>CM responsible for time and cost overruns</b></li> <li>• Can provide GMP</li> <li>• Manages the trade subs</li> </ul>   | Same as CM at Fee, but also: <ul style="list-style-type: none"> <li>• Some duplication of administration</li> <li>• More paperwork for owner</li> <li>• <b>Can be difficult to manage all phased packages</b></li> </ul>   |
| D-B             | <ul style="list-style-type: none"> <li>• Reduced administration</li> <li>• Single-source responsibility</li> <li>• Good product quality</li> <li>• Innovation</li> <li>• Cost savings</li> <li>• Can speed delivery schedule</li> <li>• Accountability</li> <li>• Improved risk management</li> <li>• Integrated design/construction</li> <li>• Know costs early in process</li> <li>• Can request GMP</li> </ul> | <ul style="list-style-type: none"> <li>• Limited competition</li> <li>• New unfamiliar method</li> <li>• Needs well defined scope</li> <li>• <b>Minimized owner control in design</b></li> <li>• Procurement can be lengthy</li> </ul>   |
| DBOOT           | <ul style="list-style-type: none"> <li>• Same benefits as DBFO</li> <li>• Ownership is transferred</li> </ul>   | <ul style="list-style-type: none"> <li>• Same disadvantages of DBFO</li> <li>• Difficulty with long-term relationships</li> <li>• Future political bodies may not accept/agree</li> </ul>  |
| DBMO            | <ul style="list-style-type: none"> <li>• Treats planning, design and construction as integrated tasks</li> <li>• One contract for all services</li> <li>• O&amp;M is considered during design</li> <li>• Better life-cycle costs</li> <li>• Similar benefits as D-B</li> </ul>  | <ul style="list-style-type: none"> <li>• Long procurement process</li> <li>• Costly</li> <li>• Similar disadvantages as D-B</li> </ul>   |
| DBFO            | <ul style="list-style-type: none"> <li>• Complete projects that need external funding assistance</li> <li>• Treats planning, design and construction as integrated tasks</li> <li>• O&amp;M is considered during design</li> <li>• Better life-cycle costs</li> <li>• Better net present value</li> <li>• Similar benefits as D-B</li> </ul>  | <ul style="list-style-type: none"> <li>• Costs more in the long run</li> <li>• Long procurement process</li> <li>• Same disadvantages of DBFO</li> <li>• Difficulty with long-term relationships</li> <li>• Future political bodies may not accept/agree</li> </ul>                        |

## Recommendations

1. Opt for some form of “alternative” project delivery method and reject the traditional design-bid-build approach.

### Discussion:

Although the owners (i.e., end users – City, County, and Las Companas) are more familiar with the traditional DBB approach, and value more open competition in the procurement process, the nature of the owners and characteristics of the project suggest that an alternative method of project delivery would be more advantageous. The owners lack the staff support and expertise to manage the design and construction of a large, complex, \$100 million project, and would therefore be well served by an entity specializing in the design and construction of similar project types. Further, the owners have as high priorities cost control and known costs early in the process in order to facilitate the enormous effort of financing the Project. Further, the owners have as high priorities that the project be completed as soon as possible, and that there is schedule accountability. The owners want to avoid risks, administrative burdens, claims, and litigation to the extent practicable. Lastly, the owners have as a high priority that the Project is of high quality and performs as intended. ALL of these desirable attributes can be provided via some form of alternative project delivery method, and the disadvantages associated with the traditional D-B-B method can be avoided.

Note: An analysis of the various project delivery methods indicates that at this stage of project development, there is little variation among the methods with regard to the ultimate delivery date of the facility (i.e., the “on-line” date). See attached schedules for each.

2. Immediately initiate procurement of an Owners’ Agent (OA) to represent and assist the owners throughout the project delivery process.

The Project is extremely complex, very costly, high-profile, and essential to the Owners’ water supply needs. Consequently, regardless of the type of project delivery method ultimately chosen, the Owners would necessarily require the specialized services of an owner agent/representative, as is customary for projects of this complexity and scale. This type of assistance normally costs approximately 1% - 2% of the overall project costs. The OA would:

- Manage and guide the overall procurement process. This would include making a recommendation on the type of alternative delivery method most appropriate for the project and also on the most advantageous type of contract (e.g., GMP, cost plus, lump sum, etc.)
- Develop a detailed critical path for the Project
- Provide QA/QC oversight of contractors
- Provide guidance during the design phase

- Provide engineering services during construction, including inspection and “as-built” support.
- Provide guidance and assistance with the preparation of a funding plan for the project
- Take the Project from its current preliminary design status through 30% design. This would not only provide the basis for partially cost-based proposals but also compress the overall procurement process by 4 to 6 months.
- Function as liaison between the owners, other contractors, agencies, and the public

## **Alternate Delivery Considerations**

### **Buckman Diversion**

Several delivery options are available to the City as it seeks to implement the Buckman Diversion project over the next several years. These range from the “traditional” design-bid-build approach, to design/build (DB), privatized operations options including design/build/operate (DBO) and design/build/own/operate/transfer (DBOOT), design/construction management at-risk (DCMR), and variations on these. Considerations in selection of a delivery approach are highlighted below, as they specifically relate to the Buckman Diversion project; this is not an exhaustive comparison of delivery options. Often, delivery method choices are driven by an interest in accelerating schedule and/or containing costs, funding availability, program management/control during implementation and operation, and past experience with the various delivery methods.

#### **Schedule**

- Alternative delivery methods such as DB can offer schedule advantages over traditional methods in that the separate construction bidding period can be avoided, and portions of the design and construction might be overlapped, depending on the specifics of the project.
- Procurement of the DB or other engineer/contractor team may take longer than procurement of an engineer under traditional methods, in that the City’s procurement procedures are well established for the traditional approach. This could offset a portion of the DB schedule advantage.
- Funding availability issues could negate schedule advantages of alternate delivery methods or actually delay implementation further, in that the City may be unable to contract for construction (i.e., design/build) until construction funding is available (as further described below).

#### **Costs**

Engineering costs may be similar or lower for DB or other non-traditional methods, depending on whether the City chooses to take design drawings to a “100 percent” level for record drawings or other needs (e.g., permitting approvals, funding, etc.). Further, resident inspection costs and engineering services during construction can be reduced with alternative delivery methods, possibly reducing engineering fees by about 20 percent, or about 2 to 4 percent of overall project costs.

Construction costs are typically similar between the various methods and are usually not a major driver for selection of a delivery method.

#### **Funding / Funding Availability**

- The City cannot obligate funds without having first secured the funding to support that commitment, but it is unlikely that major federal funding for construction would be available any sooner than 4Q04 or 1Q05.
- Under a traditional approach, design could progress while funding for the construction phase was being secured (i.e., by completing most or all of the design in CY2004). Under



a DB or DBO approach, contracting for the engineer/contractor team may need to wait until construction funding becomes available.

- Some options for addressing this concern might include:
  - o DBOOT, in which the City (and possibly its partners) would reduce up-front capital expenditures at the potential expense of higher annualized costs by privatizing operations and financing
  - o Seek major funds (e.g., bond issue) sooner than federal construction funds could become available (e.g., mid-2004 instead of late 2004) to support contracting for construction via traditional or alternative delivery methods.
  - o Split construction components up into separate, smaller packages, recognizing that major construction could still not proceed until funding from one of the above sources became available, costs to bid separate packages would be higher, and contractor bids on a series of smaller projects would likely be higher than on a single larger project.
  - o Traditional approach with design complete by late 2004 and bidding (or at least preparation of bidding packages) completed by late 2004.
- In lieu of major construction funding being available before late 2004 or early 2005, the traditional method may lead to the fastest project completion in that construction could commence in early 2005, rather than awarding a DB or other alternative delivery contract in early 2005 and completing design starting at that time.
- Certain federal loan and/or grant programs may have constraints on the use of alternative delivery methods.

#### **Program Management and Control (Design, Construction, Operation)**

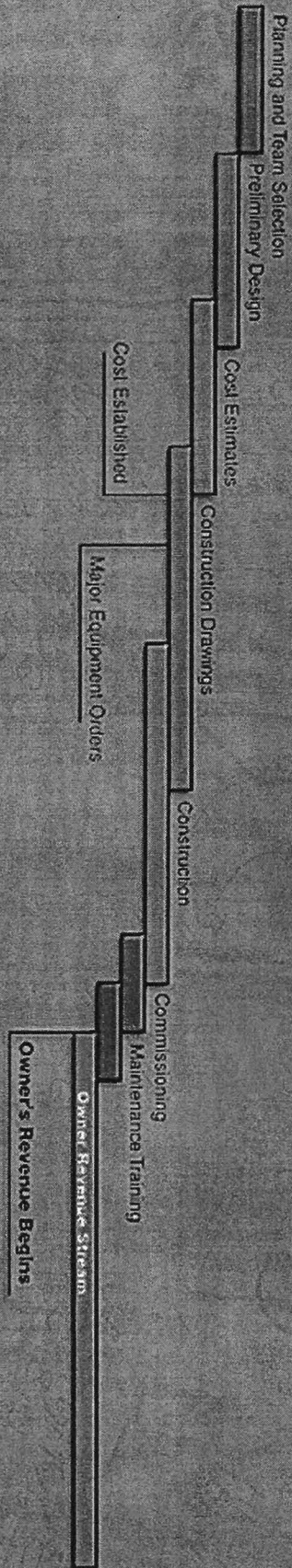
- DB and some other alternative delivery methods can offer the owner a single point of contact and responsibility, often seen as a benefit to owners as engineer/contractor conflicts are internalized to the DB team.
- Contract (privatized) operations, whether combined with a traditional approach or alternative delivery approach, may be more agreeable to multi-party/multi-owner arrangements in that no single entity has direct operational control of the facilities.
- Some owners prefer the separation of engineer/contractor roles, such that the engineer's role is more clearly defined for quality assurance and cost control as the owner's representative.
- Some owners are averse to turning over ownership, operation, and control of facilities to other (privatized) entities, whereas others do not take issue with this.

#### **Experience with Alternative Delivery Methods**

- Many municipalities transition slowly into DB and other alternative deliveries, and/or regularly use alternative delivery methods only for their smaller or routine projects. As such, it would be atypical for a community to first demonstrate the use of an alternate delivery method on a project the size and criticality of the Buckman Diversion.
- Modifications to the City's procurement rules would need to be finalized to accommodate the selected delivery approach, may not cover all components of the alternative delivery method selected, and may best be refined through experience on smaller, less time-critical/cost-critical projects.

# Project Delivery Method Timeline Comparison

## Design-Build



## Design-Bid-Build

